

Using Social Networks to Improve Agricultural Extension Services

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Motivation

- Examples abound in development of relatively inexpensive welfare-improving technologies that are not adopted by poor households
 - Insecticide treated bed-nets
 - Improved cook stoves
 - Condoms
 - Hand-washing
- Low demand for apparently beneficial technologies may be a key constraint to development

Why Don't People Adopt?

- Apart from liquidity constraints, intra-household disagreements, risks associated with experimentation, there may be information failures.
- Do rural farmers know about the technology?
- Do they believe the official message about the benefits of the new technology?
- Are they willing to experiment with the new technology on their own plot?

Government Extension Services

- Government Departments of Agricultural Extension ubiquitous all over the developing world
 - Extension workers transfer knowledge from researchers to farmers,
 - Advise farmers on their decision making,
 - stimulate desirable agricultural developments by providing informal education to farmers through meetings, demonstrations, and field days

Developing region	Total public extension personnel ('000)
Latin America	28
Middle East–North Africa	34
Asia	277
Sub-Saharan Africa	57
Total developing countries	396

Anderson, Jock and Gershon Feder (2007). "Agricultural Extension," Handbook of Agricultural Economics, volume 3, Chapter 44, Agriculture and Rural Development Department, World Bank, Washington, DC.

State of Extension Services

- Data shows that these extension workers often lack the necessary orientation and facilities in technical knowledge, farming skills, economic analysis, research procedures, and communication abilities
- “Most development specialists view the present education system as defective.” Chaudhry, M.A., & F.M. Al-Haj (1985). “A Critical Analysis of Agricultural Education and Extension in Developing Countries,” *Agricultural Administration*, 20, 169-186.
- In 1985 in Malawi, extension workers were providing training in improved seeds, applications of fertilizer, pest control
- Ratio of technical assistant-to-farm household = 1:827,
- Many farmers not reached and technology adoption rates remained low
 - No districts had greater than 10% of maize plots planted in hybrid maize
 - Adoption was negligible in many districts
- Today about 50% of all extension positions remain unfilled

Social Networks and Technology Adoption

- Long-standing literatures in sociology and in economics (Rogers 1962, Conley and Udry 2010, Foster and Rosenzweig 1995) quite clear that:
 - information on new technologies flow through social networks
 - People learn about the existence of new technologies from friends, relatives, neighbors
 - People learn how to use technologies from their networks
 - People learn about the effectiveness of technologies by observing the performance on their friends, relatives, neighbors' plots

Project Description

- Introduce in Malawian maize-growing villages:
 - Two promising technologies promoted by our implementation partner, the Malawi Ministry of Agriculture (Dept. of Agricultural research)
 - New “dissemination methods” that take advantage of existing social networks
 - Random assignment of technologies and dissemination methods across villages
- Project compares social network based dissemination against two types of control areas where (a) we use the traditional government extension worker based methods and (b) no special effort is made to promote these technologies
- We track short and long-term changes in information and learning, then adoption and diffusion, and finally, agricultural productivity

Two Projects

- Two overlapping and complementary “randomized intervention” projects provide us with a more complete understanding of the potential usefulness of social networks in marketing new technologies
- Project 1 evaluates simpler and easily scalable methods for choosing extension partners
- Project 2 draws on formal social network theories to optimize the choices of extension partners, given alternative theories on how information diffuses (e.g. simple vs complex contagion)
- Grateful for funding from: World Bank, WB-DIME, MCC JPAL/Gates ATAI program, 3ie,

Project Design, Project 1 (2 of 4)

Dissemination:	Extension agent		Lead Farmer		Peer Farmer		Control
Incentive: Technology	Large Incentive	Small Incentive	Large Incentive	Small Incentive	Large Incentive	Small Incentive	
Fertilizer Management	Either Male or Female (natural variation)		Male		Vary Male/Female composition of the set of Peer Farmers		
			Female				
Conservation Agriculture			Male				
			Female				

- Timeline: two household surveys, baseline and post-treatment, among 3800 farming households in 150 villages
 - First follow-up survey focuses on farmer receptiveness and retention of knowledge about the new technologies,
 - Second follow-up survey focuses more on take-up and adoption

Technologies

- Pit Planting
 - Promoted in arid districts, to aid plant retention of water
- Project 1: Fertilizer Nutrient Management
 - Efficient combinations, timing, and spatial concentration of fertilizer application
- Project 2: post-harvest crop-residue management
 - Mulch, compost, in essence “don’t burn”

Project Design, Project 2

- First conduct a Social Network Census to identify the most promising seed farmers based on their “network” positions in the village
- Treatment Groups:
 - Simple contagion: if a single connection to an extension partner is sufficient to encourage take-up, then individuals with many connections are clearly the most useful.
 - Complex contagion: if multiple sources of information are needed to encourage adoption, then clustering extension partners - so many people know several seed farmers – may hold greater promise
 - Geographic location within the village proxies the social network. Cheaper and more easily scalable

How do Networks work?

- Under complex contagion, the simple contagion strategy may be successful in diffusing information but less successful at promoting adoption.
- Research questions:
 - Can partnering with well-connected farmers in extension efforts increase technology adoption?
 - Is clustering of extension partners desirable, or should those partners be spatially and socio-economically diffuse?
 - What fraction of the gains from utilizing networks can be achieved with an easily scalable proxy for the social network?

Concluding Remarks

- The projects raise a few simple questions:
 - Can existing extension services be improved?
 - Can we cheaply and more effectively communicate with a wider set of farmers?
 - Given the importance of social networks established in sociology, economics, CS literatures,
 - How do we optimize the use of networks?
 - Would networks do a better job of convincing farmers than our paid extension workers currently do?
- Preliminary results from our first project indicates that there are significant differences in information retention across treatment groups